IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Cavaglia, G.	)	Docket No. CAVA3001/JEK
	)	Art Unit: 1711
For: Continuous Process for Solid Phase Polymerisation of Polyester	)	Examiner: Listvoyb, Gregory
Serial No. 10/523,650	)	
Filed: 02/04/2005	)	

Commissioner for Patents
P.O. Box 1450
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DECLARATION OF DR. DOUGLAS DAVID CALLANDER

I, Douglas David Callander, hereby declare that:

1. I am a resident of Akron, Ohio and am presently employed as a Senior Scientist by M&G Polymers USA, a subsidiary of the M&G Group of Companies of which COBARR SpÀ, the owner of the patent application in issue, is also a member. I am not an inventor of the subject matter disclosed or claimed in the subject patent application.

2. My educational background includes a Bachelor's Degree in Chemistry from the University of Edinburgh in Scotland (1960) and a Ph.D in Chemistry from the University of Birmingham in England (1966).

3. I am a named inventor on at least twenty three (23) United States letters patents, almost all of which relate to the field of polyester polymers.

4. I was employed by E.I. Dupont de NeMours for 2 years, The Goodyear Tire & Rubber Company for approximately 23 years and Shell Chemical Company for 9 years and

M&G Polymers for 8 years. I have worked in the field of polyester resins for 40 years. My job function was primarily a research scientist in the field of polyester resins. I am familiar with all types of solid phase polymerization processes, including horizontal inclined reactors, fluidized bed reactors, thermal screw reactors, vertical bed reactors, microwave reactors, and rotating vacuum reactors.

5. During my career, I was a contemporary and colleague of V. Rinehart, Ben Duh, Steve Scannapieco, and William Tung, all of whom have been named in prior art regarding this patent application. I am a co-inventor with Ben Duh and William Tung.

6. I have also interviewed, hired, and supervised many personnel in the field of polyester resins for packaging and I understand the level of knowledge of one of ordinary skill in the art of polyester manufacturing and a I have good grasp of what one of ordinary skill would or would not do regarding continuous solid phase polymerization of polyesters, particularly polyethylene terephthalate (PET) and its copolyesters.

7. I am also quite familiar with the polyester resin requirements for bottles, in particular the requirement for low acetaldehyde content, the absence of color, and good aesthetics. I have met personally with many bottle manufacturers and end users to discuss these requirements, even from the inception of the polyester bottle industry in late 1977.

8. I have read the Application No. 10/523,650 and the patents to Kerpes (US Patent No. 5,362,844), Coover (US Patent No. 3,075,952) and Jones (US Patent No. 5,409,983) cited and applied in the Office Action dated 17 November 2008. I have also read the Declaration of Verne Rinehart submitted on 27 November 2007.

9. The 17 November 2008 Office Action asserts that one of ordinary skill would use the pellets of Kerpes in the slanted horizontal rotating reactor of Coover. For the reasons outlined below, I conclude that one of ordinary skill in the art would never combine the pellets of Kerpes with the somewhat tilted horizontal rotating reactor as described in Coover – principally because the stated benefits of Kerpes' process would be destroyed by using the rotating horizontal reactor of Coover.

10. Kerpes teaches that the molecular weight (I.V.) increase, also known as lift, be limited to only the amount needed to remove the acetaldehyde. (Col 3, lines 49-55). To accomplish this, Kerpes unequivocally teaches one of ordinary skill that the I.V. of the melt polymerized

material be only slightly lower than the desired final I.V., for example 0.05 to 0.15 dl/g. (See again, Col 3, lines 49-55). Because one of ordinary skill knows that polyester food packaging requires a molecular weight (I.V.) of between about 0.65 dl/g and 1.00 dl/g, the melt I.V. cannot be below about 0.50. A minimum melt I.V. of 0.50 dl/g is outside and mutually exclusive with the preferred maximum 0.45 dl/g I.V. of Coover (Col 4, Lines 12-17).[1]

One of the reasons for keeping the I.V. lift low is to maintain a more consistent I.V. throughout the granule. High I.V. lifts are associated with extreme processing difficulties during the extrusion step in which the solid phase polymerized polyester granules are remelted and formed into a new article, such as a preform as evidenced in Jones (Example 1, Col 10, Line 66 – Col 11, Line 1).

I have been personally involved where the lift was so great that while the composite I.V. of the granule was "correct", the I.V. on skin was so high and crystalline that the skin never completely melted during the extrusion step and appeared as visual unmelts in the final bottle, rendering the bottle unsuitable for the market. This unsuitability for the market is consistent with the teachings of Kerpes at Col 1, lines 32-34 that the bottle must be highly transparent. In my example, the problem was solved by raising the melt I.V. and reducing the I.V. lift as taught in Kerpes.

Coover on the other hand is diametrically opposed to Kerpes' requirement of a low I.V. lift. Rather than the IV lift being less than 0.15 dl/g, Coover teaches that the I.V. lift be **at least** 0.3 units and usually 0.4 units or more. (Col 2, Lines 37-39). Processing granules under these conditions would lead to the unmelts I note in the previous paragraph and would render the granules of Kerpes unsuitable for use in the bottle of Kerpes, as taught by Kerpes (Col 1, lines 32-34).

Coover et al avoids the high I.V. skin and unmelts by using a very fine ground powder which overcomes the diffusion effects. However, I agree with Mr. Rinehart's Declaration and his patent teaching that powders are not suitable for making bottles. I also note that Kerpes et al requires a very specific granule size (Col 4, Lines 9-13) which is much larger than the

[1] Coover et al teaches the polymer I.V. is advantageously not greater than 0.45 dl/g and preferably between 0.15-0.40 dl/g.

powder of Coover and therefore does not permit grinding. Therefore, in order to meet the granule size required of Kerpes, one of ordinary skill is left with adding the granules of Kerpes et al to the rotating reactor of Coover et al and incurring its disadvantages noted below.

11. The use of the granules of Kerpes in the rotating reactor of Coover et al would destroy the utility of the granules in Kerpes for bottles due to the discoloration of the resin. The polyester resin industry has for years measured color on its resin with discoloration being considered an almost absolute disqualification for use in bottles. While some polyester bottles are intentionally colored (green for 7UP, Amber for Beer), the vast majority of polyester bottles used for soft drinks are colorless/clear and as noted by Kerpes, the non-colored packaging should be highly transparent and subjectively **colorless** (Col 1, Line 34). Coover et al teaches that particles larger than a 20 mesh screen (840 micron or 0.840 mm) "tend **to introduce discoloration** and slow down the rate of molecular weight build up" (See Col 4, lines 71 – 73 and the previously defined particle size of less than 20 mesh (.84 at col 2, line 23). I note that the required particle size of granules in Kerpes et al is much larger than 20 mesh and the Kerpes granules would therefore process slower and would, in the end be discolored and make a bottle which is not subjectively colorless as required by Kerpes. Since making bottles is a primary purpose of Kerpes, it is inconceivable that one of ordinary skill would take the large granules of Kerpes et al and process them in a rotating reactor of Coover et al, when Coover et al says that the reaction rate will be slower and the resulting resin, and therefore bottle, will be discolored.

12. One of ordinary skill would not grind the granules of Kerpes et al. First, if the granules were ground, they would cease to be granules and the process would be solid stating a powder. The industry has no use for powders and most of the consumers require the granules to be de-dusted or have the fines removed as a specification. To use a powder for bottle resin would go against the entire industry infrastructure.

13. I disagree with the Examiner's position that the rotating reactor is a more effective process for the removal of water and aldehyde. I know of no evidence to support that

contention and in fact, believe it to be the opposite. As explained in Rinehart (Rinehart Declaration at 11) the gas in the rotating reactor lies on top of the bed, whereas in the upright cylinder, the gas passes through the entire bed from the bottom to the top, thus I would expect the upright cylinder to be more efficient, which explains why it is the workhorse of industrial practice.

14. I declare that all statements made herein of my knowledge are true and that all statements made on information and belief are believed to be true and, further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the U.S. Code and that such willful false statements may jeopardize the validity of this application and any patent issuing thereon.

Respectfully submitted,

Douglas David Callander

April 30, 2009

Douglas David Callander, PhD